

Tetra Tech, Inc.
DATA VALIDATION REPORT
LEVEL II

Site: West Lake Landfill Site, Bridgeton, Missouri

Laboratory: TestAmerica Laboratories, Inc. (Earth City, Missouri)

Data Reviewer: Harry Ellis, Tetra Tech, Inc. (Tetra Tech)

Review Date: May 20, 2014

Sample Delivery Group (SDG): J6628

Sample Numbers: WAA-01-AF-PS-20140508, WAA-02-AF-PS-20140508, WAA-03-AF-PS-20140508, WAA-04-AF-PS-20140508, WAA-05-AF-PS-20140508, and WAA-00-AF-TB-20140508

Matrix / Number of Samples: 5 Air Samples and 1 Trip Blank

The data were qualified according to the U.S. Environmental Protection Agency (EPA) Region 7 documents entitled "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review" (9240.1-48), June 2008. In addition, the Tetra Tech document "Review of Data Packages from Subcontracted Laboratories" (February 2002) and the EPA and others document "Multi-Agency Radiological Laboratory Analytical Protocols Manual" (July 2004) were used along with other criteria specified in the applicable methods.

The review was intended to identify problems and quality control (QC) deficiencies that were readily apparent from the summary data package. The following sections discuss any problems or deficiencies that were found, and data qualifications applied because of non-compliant QC. The data review was limited to the available field and laboratory QC information submitted with the project-specific data package.

I, Harry Ellis, certify that all data validation criteria outlined in the above-referenced documents were assessed, and any qualifications made to the data accorded with those documents.

Harry N. Ellis III

20 May 2014

Certified by Harry Ellis, Chemist

Date



DATA VALIDATION QUALIFIERS

- U** — The analyte was not detected above the reported sample quantitation limit.
- J** — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ** — The analyte was not detected above the reported sample quantitation limit, which is estimated.
- R** — The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J6628 included five (5) environmental air (filter) samples and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

There were no detectable activity in the laboratory (method) blanks. The field blank yielded a low gross beta activity. The other field samples yielded about 10 times that activity, so no qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis

13715 Rider Trail North

Earth City, MO 63045

Tel: (314)298-8566

TestAmerica Job ID: 160-6628-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc.

415 Oak Street

Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



Authorized for release by:

5/16/2014 2:45:56 PM

Erika Gish, Project Manager II

(314)298-8566

erika.gish@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Job ID: 160-6628-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-6628-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 5/12/2014 4:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.6° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-01-AF-PS-20140508 (160-6628-1), WAA-02-AF-PS-20140508 (160-6628-2), WAA-03-AF-PS-20140508 (160-6628-3), WAA-04-AF-PS-20140508 (160-6628-4), WAA-05-AF-PS-20140508 (160-6628-5) and WAA-00-AF-FB-20140508 (160-6628-6) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared and analyzed on 05/13/2014.

No difficulties were encountered during the Gross Alpha/Beta analysis.

All quality control parameters were within the acceptance limits.

Cesium-137 & OTHER GAMMA EMITTERS (GS)

Case Narrative

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Job ID: 160-6628-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Samples WAA-01-AF-PS-20140508 (160-6628-1), WAA-02-AF-PS-20140508 (160-6628-2), WAA-03-AF-PS-20140508 (160-6628-3), WAA-04-AF-PS-20140508 (160-6628-4), WAA-05-AF-PS-20140508 (160-6628-5) and WAA-00-AF-FB-20140508 (160-6628-6) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared and analyzed on 05/13/2014.

No other difficulties were encountered during the gamma analysis.

All other quality control parameters were within the acceptance limits.

>>> Select a Laboratory <<<

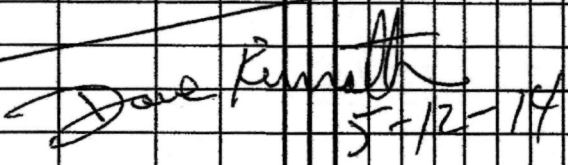
Chain of Custody Record

TestAmerica

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TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:#N/A
#N/A
#N/A
#N/A

Client Contact		Project Manager: <u>Dave Kinneth</u>		Site Contact: <u>Dave Kinneth</u>		Date: <u>5-12-14</u>		COC No:		
Your Company Name here <u>Tetra Tech Inc.</u>		Tel/Fax: <u>314 517 6798</u>		Lab Contact: <u>Mike Frank</u>		Carrier:		1 of 1 COCs		
Address <u>415 Oak Street</u>		Analysis Turnaround Time		Filtered Sample (Y/N) Perform MS / MSD (Y/N) <u>9310 Gross Alpha/Beta</u> <u>BA-01-R Gamma Spec</u> <u>9315 Tot R Alpha Radium</u> <u>A-01-R Isotope Throat</u> <u>A-01-R Isotope U Radium</u> <u>9315 Radium-226 GFC</u>		Sampler: For Lab Use Only: Walk-in Client: Lab Sampling:		Job / SDG No.:		
City/State/Zip <u>Kansas City MO 64106</u>		<input type="checkbox"/> CALENDAR DAYS <input checked="" type="checkbox"/> WORKING DAYS								
(xxx) xxx-xxxx <u>816-412-1146</u> Phone		TAT if different from Below <u>20</u>								
(xxx) xxx-xxxx <u>816-410-1748</u> FAX		<input type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day								
Project Name: <u>Westlake Landfill</u>		Sample Date		Sample Time	Sample Type (C=Comp, G=Grab)	Filter Matrix	# of Cont.	* NOTE: Sample Specific Notes: <u>9315-Radium-226 (GFC)-contingent upon TAR results for all samples</u>		
Site: <u>Westlake Landfill - Bridgeton MO</u>		WAA-01-AF-PS-20140508		5-8-14	11:41	Air	Air			1
PO# <u>110.5610</u>		WAA-02-AF-PS-20140508			13:50					
		WAA-03-AF-PS-20140508			12:39					
		WAA-04-AF-PS-20140508			13:19					
		WAA-05-AF-PS-20140508			14:13					
		WAA-00-AF-FB-20140508		✓	14:30	✓	✓	✓		
<div style="text-align: center;">  <u>5-12-14</u> </div>										
Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4= HNO3, 5= NaOH, 6= Other										
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.					Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)					
<input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown					<input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months					
Special Instructions/QC Requirements & Comments:										
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd:		Corr'd:		Therm ID No.:		
Relinquished by: <u>Dave Kinneth</u>		Company: <u>Tetra Tech</u>		Date/Time: <u>5-12-14 16:25</u>		Received by: <u>Mike Clark</u>		Company: <u>TA512</u>		
Relinquished by:		Company:		Date/Time:		Received by:		Company:		
Relinquished by:		Company:		Date/Time:		Received in Laboratory by:		Company:		

160-6628 Chain of Custody

Westlake Landfill Weekly Air Filter Samples Collection Summary
dates 5-1-14 to 5-8-14

Station	Location	Filter Holder #	Begin Time	Begin Flow Rate	End Time	End Flow Rate	Total Time (mins)	AVG Flow	Sample Vol
1	MGP	1	13:39	2.5 cfm	11:41	2.16 cfm	9990	2.33	23277 cf
2	PVA	2	13:59	2.5 cfm	13:50	2.33 cfm	10074	2.42	24379 cf
3	PVFD	3	14:44	2.52 cfm	12:39	2.39 cfm	9948	2.45	24373 cf
4	SV	4	14:29	2.52 cfm	13:19	2.33 cfm	10008	2.43	24319 cf
5	SC	5	14:15	2.5 cfm	14:13	2.3 cfm	10080	2.4	24192 cf
FB	NA	6	NA	NA	NA	NA	NA	NA	NA

Sample Number	
WAA-01-AF-PS-20140508	23277
WAA-02-AF-PS-20140508	24379
WAA-03-AF-PS-20140508	24373
WAA-04-AF-PS-20140508	24319
WAA-05-AF-PS-20140508	24192
WAA-00-AF-FB-20140508	na

Sample Volume (cubic feet)

Login Sample Receipt Checklist

Client: Tetra Tech EM Inc.

Job Number: 160-6628-2

Login Number: 6628

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	Thermal preservation not required.
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ ($1/4"$).	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

TestAmerica St. Louis

Sample Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-6628-1	WAA-01-AF-PS-20140508	Filter	05/08/14 11:41	05/12/14 16:25
160-6628-2	WAA-02-AF-PS-20140508	Filter	05/08/14 13:50	05/12/14 16:25
160-6628-3	WAA-03-AF-PS-20140508	Filter	05/08/14 12:39	05/12/14 16:25
160-6628-4	WAA-04-AF-PS-20140508	Filter	05/08/14 13:19	05/12/14 16:25
160-6628-5	WAA-05-AF-PS-20140508	Filter	05/08/14 14:13	05/12/14 16:25
160-6628-6	WAA-00-AF-FB-20140508	Filter	05/08/14 14:30	05/12/14 16:25

Client Sample Results

Client Tetra Tech EM Inc
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Client Sample ID: WAA-01-AF-PS-20140508

Lab Sample ID: 160-6628-1

Date Collected: 05/08/14 11:41

Matrix: Filter

Date Received: 05/12/14 16:25

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.837	J	0.330	0.344	10.0	0.283	pCi/Sample	05/13/14 14:31	05/13/14 15:23	1
Gross Beta	12.3		0.986	1.58	10.0	0.402	pCi/Sample	05/13/14 14:31	05/13/14 15:23	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	2.22	U U	10.3	10.3	20.0	19.0	pCi/Sample	05/13/14 14:35	05/13/14 19:03	1

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	05/13/14 14:35	05/13/14 19:03	1

Client Sample ID: WAA-02-AF-PS-20140508

Lab Sample ID: 160-6628-2

Date Collected: 05/08/14 13:50

Matrix: Filter

Date Received: 05/12/14 16:25

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.567	J	0.310	0.316	10.0	0.373	pCi/Sample	05/13/14 14:31	05/13/14 15:24	1
Gross Beta	11.9		0.977	1.54	10.0	0.385	pCi/Sample	05/13/14 14:31	05/13/14 15:24	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.407	U U	4.59	4.59	20.0	8.50	pCi/Sample	05/13/14 14:35	05/13/14 16:46	1

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Be-7	137	J	40.6	43.0		27.0	pCi/Sample	05/13/14 14:35	05/13/14 16:46	1

Client Sample ID: WAA-03-AF-PS-20140508

Lab Sample ID: 160-6628-3

Date Collected: 05/08/14 12:39

Matrix: Filter

Date Received: 05/12/14 16:25

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.306	U U	0.240	0.242	10.0	0.332	pCi/Sample	05/13/14 14:31	05/13/14 15:24	1
Gross Beta	12.7		1.00	1.62	10.0	0.406	pCi/Sample	05/13/14 14:31	05/13/14 15:24	1

HVE

20 May 2014

TestAmerica St Louis

Client Sample Results

Client: Tetra Tech EM Inc
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Client Sample ID: WAA-03-AF-PS-20140508

Lab Sample ID: 160-6628-3

Date Collected: 05/08/14 12:39

Matrix: Filter

Date Received: 05/12/14 16:25

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	2.51	U	5.01	5.02	20.0	8.70	pCi/Sample	05/13/14 14:35	05/13/14 16:48	1
Other Detected										
Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	05/13/14 14:35	05/13/14 16:48	1

Client Sample ID: WAA-04-AF-PS-20140508

Lab Sample ID: 160-6628-4

Date Collected: 05/08/14 13:19

Matrix: Filter

Date Received: 05/12/14 16:25

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.206	U	0.180	0.181	10.0	0.242	pCi/Sample	05/13/14 14:31	05/13/14 15:25	1
Gross Beta	12.7		0.988	1.61	10.0	0.355	pCi/Sample	05/13/14 14:31	05/13/14 15:25	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.684	U	4.63	4.63	20.0	8.55	pCi/Sample	05/13/14 14:35	05/13/14 16:48	1
Other Detected										
Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Be-7	103	J	46.2	47.3		44.3	pCi/Sample	05/13/14 14:35	05/13/14 16:48	1

Client Sample ID: WAA-05-AF-PS-20140508

Lab Sample ID: 160-6628-5

Date Collected: 05/08/14 14:13

Matrix: Filter

Date Received: 05/12/14 16:25

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.898	J	0.363	0.377	10.0	0.319	pCi/Sample	05/13/14 14:31	05/13/14 15:24	1
Gross Beta	11.8		0.962	1.53	10.0	0.366	pCi/Sample	05/13/14 14:31	05/13/14 15:24	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	3.26	U	5.08	5.09	20.0	8.59	pCi/Sample	05/13/14 14:35	05/13/14 16:49	1
Other Detected										
Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Be-7	143	J	41.9	44.4		22.5	pCi/Sample	05/13/14 14:35	05/13/14 16:49	1

HWE 20 May 14

TestAmerica St Louis

Client Sample Results

Client Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Client Sample ID: WAA-00-AP-FB-20140508

Lab Sample ID: 160-6628-6

Date Collected: 05/08/14 14:30

Matrix: Filter

Date Received: 05/12/14 16:25

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.162	U	0.188	0.189	10.0	0.300	pCi/Sample	05/13/14 14:31	05/13/14 15:25	1
Gross Beta	1.31	J	0.389	0.410	10.0	0.427	pCi/Sample	05/13/14 14:31	05/13/14 15:25	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	1.79	U	5.59	5.59	20.0	10.2	pCi/Sample	05/13/14 14:35	05/13/14 16:50	1

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	05/13/14 14:35	05/13/14 16:50	1

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TestAmerica St Louis

QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-121799/1-A
Matrix: Filter
Analysis Batch: 121789

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 121799

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.04587	U	0.128	0.128	10.0	0.258	pCi/Sample	05/13/14 14:31	05/13/14 15:23	1
Gross Beta	0.04357	U	0.193	0.193	10.0	0.359	pCi/Sample	05/13/14 14:31	05/13/14 15:23	1

Lab Sample ID: LCS 160-121799/2-A
Matrix: Filter
Analysis Batch: 121789

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 121799

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Gross Alpha	5.37	5.357		0.993	10.0	0.293	pCi/Samp	100	75 - 125

Lab Sample ID: LCSB 160-121799/3-A
Matrix: Filter
Analysis Batch: 121789

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 121799

Analyte	Spike Added	LCSB Result	LCSB Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Gross Beta	19.3	17.74		2.13	10.0	0.431	pCi/Samp	92	75 - 125

Lab Sample ID: 160-6628-1 DU
Matrix: Filter
Analysis Batch: 121789

Client Sample ID: WAA-01-AF-PS-20140508
Prep Type: Total/NA
Prep Batch: 121799

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Gross Alpha	0.837		0.4747		0.268	10.0	0.286	pCi/Samp	0.59	1
Gross Beta	12.3		12.36		1.58	10.0	0.352	pCi/Samp	0.02	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-121800/1-A
Matrix: Filter
Analysis Batch: 121831

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 121800

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	1.387	U	8.07	8.07	20.0	15.5	pCi/Sample	05/13/14 14:35	05/13/14 16:52	1
Other Detected Radionuclides										
Other Detected Radionuclide	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	05/13/14 14:35	05/13/14 16:52	1

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-121800/2-A
Matrix: Filter
Analysis Batch: 121829

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 121800

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	
Americium-241	32000	31800		3310		118	pCi/Samp	99	87 - 116	
Cesium-137	11300	11360		1200	20.0	83.5	pCi/Samp	101	87 - 120	
Cobalt-60	12900	13160		1330		36.9	pCi/Samp	102	87 - 115	

Lab Sample ID: 160-6628-1 DU
Matrix: Filter
Analysis Batch: 121829

Client Sample ID: WAA-01-AF-PS-20140508
Prep Type: Total/NA
Prep Batch: 121800

Analyte	Sample		DU		Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	
	Result	Qual	Result	Qual					RER	Limit
Cesium-137	2.22	U	-0.00345	U	5.37	20.0	12.1	pCi/Samp	0.14	1

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TestAmerica St. Louis

QC Association Summary

Client: Tetra Tech EM Inc.
Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-6628-2

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Prep Batch: 121799

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-6628-1	WAA-01-AF-PS-20140508	Total/NA	Filter	None	
160-6628-1 DU	WAA-01-AF-PS-20140508	Total/NA	Filter	None	
160-6628-2	WAA-02-AF-PS-20140508	Total/NA	Filter	None	
160-6628-3	WAA-03-AF-PS-20140508	Total/NA	Filter	None	
160-6628-4	WAA-04-AF-PS-20140508	Total/NA	Filter	None	
160-6628-5	WAA-05-AF-PS-20140508	Total/NA	Filter	None	
160-6628-6	WAA-00-AF-FB-20140508	Total/NA	Filter	None	
LCS 160-121799/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-121799/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-121799/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 121800

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-6628-1	WAA-01-AF-PS-20140508	Total/NA	Filter	None	
160-6628-1 DU	WAA-01-AF-PS-20140508	Total/NA	Filter	None	
160-6628-2	WAA-02-AF-PS-20140508	Total/NA	Filter	None	
160-6628-3	WAA-03-AF-PS-20140508	Total/NA	Filter	None	
160-6628-4	WAA-04-AF-PS-20140508	Total/NA	Filter	None	
160-6628-5	WAA-05-AF-PS-20140508	Total/NA	Filter	None	
160-6628-6	WAA-00-AF-FB-20140508	Total/NA	Filter	None	
LCS 160-121800/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-121800/1-A	Method Blank	Total/NA	Filter	None	

TestAmerica St. Louis

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